

CLAIMS:

1. A method of forming a material adjacent a conductive electrical component comprising the following steps:

providing the conductive electrical component over a substrate;

spinning a liquid onto the substrate and adjacent the conductive electrical component;

at least partially curing the liquid into a substantially self-supporting mass; and

at least partially vaporizing the mass.

2. The method of claim 1 wherein the mass comprises polyimide or photoresist and wherein the polyimide or photoresist is at least partially vaporized.

3. The method of claim 1 wherein the mass comprises a solvent after at least partially curing the liquid and wherein the solvent is removed from the mass as the mass is at least partially vaporized.

09976624-101201

1           4.    The method of claim 1 wherein the mass comprises two  
2 solvents as the liquid is spun onto the substrate, one of the solvents  
3 being more volatile than the other, wherein said more volatile solvent  
4 substantially evaporates before the mass is at least partially vaporized,  
5 wherein said other solvent substantially remains in the mass until the  
6 mass is at least partially vaporized, and wherein said other solvent is  
7 removed from the mass as the mass is at least partially vaporized.

8  
9           5.    The method of claim 1 wherein the mass is substantially  
10 totally vaporized.

11  
12           6.    The method of claim 1 further comprising forming a layer  
13 over the mass before at least partially vaporizing the mass.

14  
15           7.    The method of claim 1 wherein the mass is only partially  
16 vaporized to leave a matrix adjacent the conductive electrical component,  
17 the matrix having at least one void within it.

18  
19           8.    The method of claim 7 further comprising forming a layer  
20 over the matrix after partially vaporizing the mass.

21  
22  
23  
24

09976624-101201

1 9. A method of forming a material adjacent a conductive  
2 electrical component comprising the following steps:

3 providing a mass adjacent the conductive electrical component, the  
4 mass comprising pores, the pores having a size; and  
5 expanding the size of the pores.

6  
7 10. The method of claim 9 wherein the pores are expanded by  
8 vaporizing the mass.

9  
10 11. The method of claim 9 wherein the mass comprises a first  
11 material and a second material and wherein the pores are expanded by  
12 substantially totally vaporizing the first material while not totally  
13 vaporizing the second material.

14  
15 12. A method of forming a material adjacent a conductive  
16 electrical component comprising the following steps:

17 providing a mass adjacent the conductive electrical component; and  
18 partially vaporizing the mass to form a matrix adjacent the  
19 conductive electrical component, the matrix having at least one void  
20 within it.

21  
22 13. The method of claim 12 wherein the mass comprises a first  
23 material and wherein the partial vaporization of the mass comprises  
24 partially vaporizing the first material.

09976524-101201

14. The method of claim 12 wherein the mass comprises a first material and a second material and wherein the partial vaporization of the mass comprises substantially totally vaporizing the first material while not totally vaporizing the second material.

15. The method of claim 12 further comprising forming a layer over the mass before partially vaporizing the mass.

16. The method of claim 12 further comprising forming a layer over the matrix after partially vaporizing the mass.

17. The method of claim 12 further comprising:  
before partially vaporizing the mass, anisotropically etching the mass to form a spacer from the mass adjacent the conductive electrical component.

18. A method of forming a material adjacent a conductive electrical component comprising the following steps:

providing a mass adjacent the conductive electrical component, the mass comprising polyimide or photoresist; and  
at least partially vaporizing the mass.

09976624-101201

1 19. The method of claim 18 wherein the conductive electrical  
2 component is over a substrate and wherein the step of providing the  
3 mass comprises spinning the mass over the substrate.

4  
5 20. The method of claim 18 wherein the mass is substantially  
6 totally vaporized.

7  
8 21. The method of claim 18 further comprising forming a layer  
9 over the mass before at least partially vaporizing the mass.

10  
11 22. The method of claim 18 wherein the mass is only partially  
12 vaporized to leave a matrix adjacent the conductive electrical component,  
13 the matrix having at least one void within it.

14  
15 23. The method of claim 22 further comprising forming a layer  
16 over the matrix after partially vaporizing the mass.

17  
18 24. A method of forming an insulative spacer adjacent a  
19 conductive electrical component comprising the following steps:

20 providing a mass adjacent the conductive electrical component;  
21 anisotropically etching the mass; and

22 partially vaporizing the mass to form an insulative spacer adjacent  
23 the conductive component, the insulative spacer comprising a web having  
24 at least one void within it.

25. A method of forming an insulative spacer adjacent a conductive electrical component comprising the following steps:

providing a mass adjacent the conductive electrical component;  
anisotropically etching the mass;  
forming a layer over the anisotropically etched mass; and  
at least partially vaporizing the mass to form at least one void between the layer and the conductive electrical component, the layer and the at least one void together comprising a insulative spacer adjacent the conductive electrical component.

26. The method of claim 25 wherein the mass is substantially totally vaporized.

27. The method of claim 25 wherein the mass is only partially vaporized to leave a matrix adjacent the conductive electrical component, the matrix having the at least one void within it.

28. A method of forming a material between a pair of conductive electrical components comprising the following steps:

providing a mass between the pair of conductive electrical components; and

partially vaporizing the mass to form a matrix between the pair of conductive electrical components, the matrix having at least one void within it.

29. The method of claim 28 wherein the conductive electrical components are conductive lines.

30. The method of claim 28 further comprising forming a layer over the mass before partially vaporizing the mass.

31. The method of claim 28 further comprising forming a layer over the matrix after partially vaporizing the mass.

32. The method of claim 28 wherein the pair of conductive electrical components are horizontally displaced from one another.

33. The method of claim 28 wherein the pair of conductive electrical components are vertically displaced from one another.

34. The method of claim 28 wherein the mass extends entirely from one of the pair of conductive electrical components to another of the pair of conductive electrical components.

35. The method of claim 28 wherein the mass does not extend entirely from one of the pair of conductive electrical components to another of the pair of conductive electrical components.

007664-10100  
TOTAL 12994660

1 36. The method of claim 28 further comprising:  
2 before partially vaporizing the mass, anisotropically etching the  
3 mass to form spacers adjacent the conductive electrical components.

4  
5 37. The method of claim 28 wherein the mass comprises carbon.

6  
7 38. The method of claim 28 wherein the partial vaporizing takes  
8 place under selected conditions, the mass comprising a mixture of a  
9 material which is substantially non-vaporizable under the selected  
10 conditions and a material which is substantially vaporizable under the  
11 selected conditions.

12  
13 39. The method of claim 28 wherein the mass comprises a  
14 mixture of carbon and silicon dioxide.

15  
16 40. The method of claim 28 wherein the mass comprises a  
17 mixture of carbon and  $\text{SiC}_x$ , wherein  $x$  is from about 0.2 to about 1.5.

18  
19 41. The method of claim 28 wherein the mass comprises a  
20 material selected from the group consisting of photoresist and polyimide.



09976624-101201

1 42. A method of forming a material between conductive  
2 electrical components comprising the following steps:

3 forming a mass;

4 forming conductive electrical components within the mass and  
5 separated by an expanse of the mass; and

6 partially vaporizing the expanse of the mass to form a matrix  
7 between the pair of conductive electrical components, the matrix having  
8 at least one void within it.

9  
10 43. The method of claim 42 wherein the conductive electrical  
11 components are conductive lines.

12  
13 44. The method of claim 42 further comprising forming a layer  
14 over the mass before partially vaporizing the mass.

15  
16 45. The method of claim 42 further comprising forming a layer  
17 over the matrix after partially vaporizing the mass.

18  
19 46. The method of claim 42 wherein the mass comprises carbon.  
20  
21  
22  
23  
24

1 47. The method of claim 42 wherein the partial vaporizing takes  
2 place under selected conditions, the mass comprising a mixture of a  
3 material which is substantially non-vaporizable under the selected  
4 conditions and a material which is substantially vaporizable under the  
5 selected conditions.

6  
7 48. The method of claim 42 wherein the mass comprises a  
8 mixture of carbon and silicon dioxide.

9  
10 49. The method of claim 42 wherein the mass comprises a  
11 mixture of carbon and  $\text{SiC}_x$ , wherein x is from about 0.2 to about 1.5.

12  
13 50. The method of claim 42 wherein the mass comprises a  
14 material selected from the group consisting of photoresist and polyimide.  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24

097634-10201

1 51. A method of forming a material between a pair of  
2 conductive electrical components comprising the following steps:

3 forming at least one support member between the pair of  
4 conductive electrical components, the support member not comprising a  
5 conductive interconnect;

6 providing a mass between the at least one support member and  
7 each of the pair of conductive electrical components; and

8 vaporizing the mass to a degree effective to form at least one  
9 void between the support member and each of the pair of conductive  
10 electrical components.

11  
12 52. The method of claim 51 wherein the support member  
13 comprises an insulative material.

14  
15 53. The method of claim 51 wherein the vaporizing forms a  
16 plurality of voids between the support member and each of the pair of  
17 electrical components.

18  
19 54. The method of claim 51 wherein the support member  
20 comprises a conductive material not forming an operative conductive  
21 part of any circuitry.

22

23

24

09976624-101201

1           55. The method of claim 51 further comprising providing the  
2 mass outwardly of at least one of the pair of conductive electrical  
3 components.

4  
5           56. The method of claim 51 further comprising forming a layer  
6 over the mass before vaporizing the mass.

7  
8           57. The method of claim 51 wherein the pair of conductive  
9 electrical components are horizontally displaced from one another.

10  
11           58. The method of claim 51 wherein the pair of conductive  
12 electrical components are vertically displaced from one another.

13  
14           59. The method of claim 51 further comprising planarizing the  
15 mass.

16  
17           60. The method of claim 51 wherein the mass comprises carbon.

18  
19           61. The method of claim 51 wherein the vaporizing takes place  
20 under selected conditions, the mass comprising a mixture of a material  
21 which is substantially non-vaporizable under the selected conditions and  
22 a material which is substantially vaporizable under the selected  
23 conditions.  
24

1        62. The method of claim 51 wherein the mass comprises a  
2 mixture of carbon and silicon dioxide.

3  
4        63. The method of claim 51 wherein the mass comprises a  
5 mixture of carbon and  $\text{SiC}_x$ , wherein x is from about 0.2 to about 1.5.

6  
7        64. The method of claim 51 wherein the mass comprises a  
8 material selected from the group consisting of photoresist and polyimide.

9  
10       65. A method of forming a material between a pair of  
11 conductive electrical components comprising the following steps:

12       forming a mass;

13       forming a pair of conductive electrical components within the mass  
14 and separated by an expanse of the mass;

15       forming at least one support member within the expanse of the  
16 mass, the support member not comprising a conductive interconnect; and

17       vaporizing the expanse of the mass to a degree effective to form  
18 at least one void between the support member and each of the pair  
19 of conductive electrical components.

20  
21       66. The method of claim 65 wherein the vaporizing forms a  
22 plurality of voids between the support member and each of the pair of  
23 electrical components.

09976624-101201

1 67. The method of claim 65 wherein the support member  
2 comprises an insulative material.

3  
4 68. The method of claim 65 wherein the support member  
5 comprises a conductive material not forming an operative conductive  
6 part of any circuitry.

7  
8 69. The method of claim 65 further comprising forming a layer  
9 over the mass before vaporizing the mass.

10  
11 70. The method of claim 65 wherein the mass comprises carbon.

12  
13 71. The method of claim 65 wherein the vaporizing takes place  
14 under selected conditions, the mass comprising a mixture of a material  
15 which is substantially non-vaporizable under the selected conditions and  
16 a material which is substantially vaporizable under the selected  
17 conditions.

18  
19 72. The method of claim 65 wherein the mass comprises a  
20 mixture of carbon and silicon dioxide.

21  
22 73. The method of claim 65 wherein the mass comprises a  
23 mixture of carbon and  $\text{SiC}_x$ , wherein  $x$  is from about 0.2 to about 1.5.  
24

0997664-10401  
T02T01-42992660

1 74. The method of claim 65 wherein the mass comprises a  
2 material selected from the group consisting of photoresist and polyimide.

3  
4 75. An insulating material adjacent a conductive electrical  
5 component, the insulating material comprising a matrix and at least one  
6 void within the matrix, wherein the matrix comprises a partially  
7 vaporized material.

8  
9 76. The insulating material of claim 75 comprising a plurality  
10 of voids within the matrix.

11  
12 77. The insulating material of claim 75 wherein the matrix  
13 comprises partially vaporized carbon.

14  
15 78. The insulating material of claim 75 wherein the partially  
16 vaporized material is selected from the group consisting of polyimide  
17 and photoresist.

18  
19 79. The insulating material of claim 75 comprising a dielectric  
20 constant of less than or equal to about 2.

09976624-101201

1 80. An insulating material between a pair of conductive electrical  
2 components, the insulating material comprising a matrix and at least one  
3 void within the matrix, the matrix comprising a partially vaporized  
4 material.

5  
6 81. The insulating material of claim 80 comprising a plurality  
7 of voids within the matrix.

8  
9 82. The insulating material of claim 80 comprising a dielectric  
10 constant of less than or equal to about 2.

11  
12 83. The insulating material of claim 80 wherein the matrix  
13 comprises partially vaporized carbon.

14  
15 84. The insulating material of claim 80 wherein the partially  
16 vaporized material is selected from the group consisting of polyimide  
17 and photoresist.

18  
19 85. The insulating material of claim 80 wherein the matrix  
20 comprises silicon dioxide.

21  
22 86. The insulating material of claim 80 wherein the matrix  
23 comprises  $\text{SiC}_x$ , and wherein  $x$  is greater than 0.  
24



1 87. An insulating region between a pair of conductive electrical  
2 components comprising:

3 a support member, the support member not comprising a  
4 conductive interconnect; and

5 at least one void between the support member and at least one  
6 of the pair of conductive electrical components.

7  
8 88. The insulating region of claim 87 wherein the support  
9 member is vertically displaced from one of the pair of conductive  
10 electrical components and horizontally displaced from another of the pair  
11 of conductive electrical components.

12  
13 89. The insulating region of claim 87 comprising a dielectric  
14 constant of less than or equal to about 2.

15  
16 90. The insulating region of claim 87 wherein the support  
17 member is vertically displaced from one of the pair of conductive  
18 electrical components and horizontally displaced from another of the pair  
19 of conductive electrical components, the support member being in  
20 physical contact with the conductive electrical component from which it  
21 is vertically displaced.

00976624-101201

1 91. An insulating region between a pair of conductive electrical  
2 components comprising:

3 a support member between the conductive electrical components,  
4 the support member not comprising a conductive interconnect; and

5 at least one void between the support member and each of the  
6 pair of conductive electrical components.

8 92. The insulating region of claim 91 further comprising a  
9 matrix between the support member and at least one of the conductive  
10 electrical components, at least one of the voids being within said matrix.

12 93. The insulating region of claim 91 wherein the matrix  
13 comprises partially vaporized carbon.

15 94. The insulating region of claim 91 comprising a dielectric  
16 constant of less than or equal to about 2.

18 95. The insulating region of claim 91 wherein the matrix  
19 comprises a partially vaporized material selected from the group  
20 consisting of polyimide and photoresist.

22 96. The insulating region of claim 91 wherein the matrix  
23 comprises silicon dioxide.

ADD C2

ADD B1